4.8 INCORPORATING PRACTICES INTO TYPICAL DEVELOPMENT PROJECTS

√ Single Family Residential	√ Commercial/Retail/Office
√ Multi Family Developments	√ Downtown Redevelopment

The purpose of this section is to help visualize ways in which various structural practices can be employed, alone or in combination, to achieve more sustainable drainage site design. Some of the development now occurring in the Coastal Zone already includes a sustainable drainage system, although conveyance and flood control may have been the primary design considerations. This is especially apparent in residential developments that incorporate open channel drainage for stormwater conveyance.

In addition, many developments along the coast are required by drainage districts, counties, and other regulatory entities to provide stormwater detention for flood control. This guidance manual describes in Chapter 6 how these detention facilities, with potentially only the slightest modification, can also improve the performance of drainage systems, while providing aesthetic benefits, recreational opportunities, and wildlife habitat.

4.8.1. SINGLE FAMILY RESIDENTIAL

Structural stormwater controls that make sense in a medium or high-density subdivision include bioretention, porous pavement, and vegetated swales and filter strips. Current construction practices for low density subdivisions usually include features that function as vegetated swales and filter strips.

4.8.2. MEDIUM AND HIGH DENSITY RESIDENTIAL

When designing roadways in medium density areas, conveyance of stormwater in open channels (e.g., vegetated swales and filter strips) are a logical choice if lot widths are of sufficient length to include driveways and culverts. When lots are narrow in width, an alley to service the homes can be constructed in the backyards so that street drainage is not impeded by driveway culverts, thus, promoting sheet flow in a filter strip type method from the street to the vegetated swale. While vegetated swales and filter strips may be difficult to employ in downtown, commercial, or very high density developments because of space constraints, they are well suited to receive stormwater in some lower density areas, such as the medium density subdivision pictured in Figure 4-2. As described in Chapter 2, the use of fertilizers and pesticides should be kept to an absolute minimum in order to realize the full benefits of vegetated swales or filter strips.

Figure 4-2: Medium density neighborhood uses vegetated swales for stormwater conveyance. These swales also provide water quality benefits.

Narrow sidewalks, roads and driveways, separated from each other by vegetation, help to minimize and disconnect impervious surfaces, as in Figure 4-3.

Figure 4-3: Disconnected and minimized impervious cover in Chambers County, Texas.

Driveways which use permeable pavers can help reduce overall impervious cover on a residential site (see Figure 4-4), which reduces detention requirements. Lawns or bioretention areas on either side of the driveway can further improve the performance of a site.

Figure 4-4: Driveway constructed of permeable pavers. (Photo courtesy of Mutual Materials)

4.8.3. WATERFRONT

Waterfront development, whether single family or multi-family, could include similar strategies for stormwater management as some higher density developments. Permeable pavement, bioretention areas, infiltration basins or vegetated filter strips and swales should be employed to collect and treat stormwater. Figure 4-5 illustrates how a variety of sustainable drainage practices can be incorporated into a site.

Waterfront development, whether residential or commercial, should always include an intact riparian zone buffer between the development and the waterway it is overlooking. As discussed in the beginning of this chapter, a riparian buffer should be at least 25 feet wide and should extend the entire length of the development along the waterway.

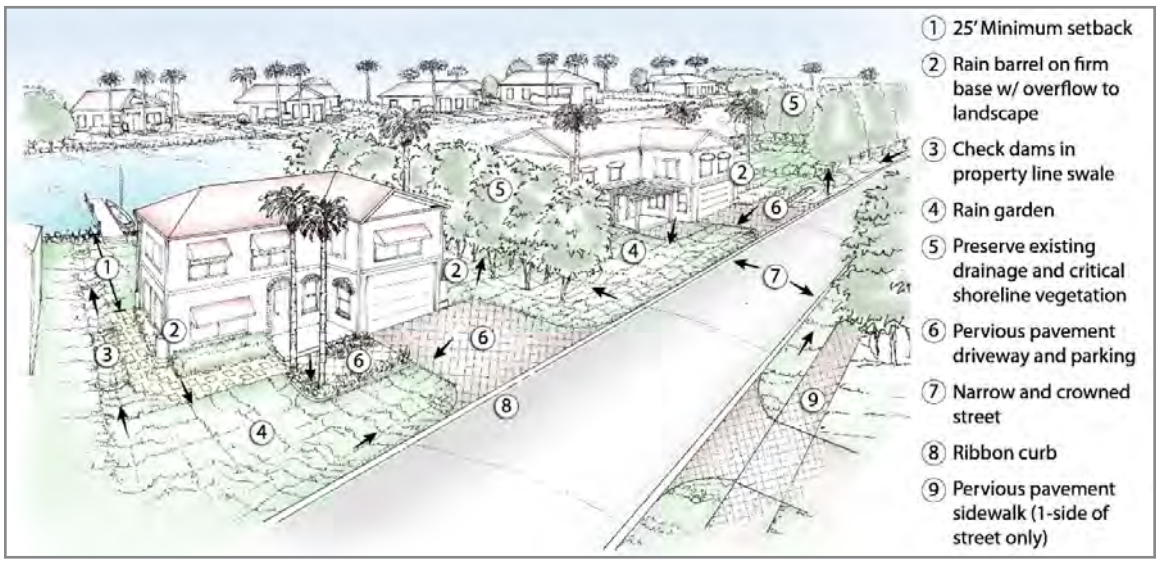

Figure 4-5: Example of waterfront development with sustainable drainage features.

4.8.4. MULTI-FAMILY DEVELOPMENTS

Options for sustainable stormwater management in high impervious cover areas such as multi-family developments include pervious pavers, bioretention areas and infiltration facilities. In Figure 4-6, bioretention areas are integrated with conventional landscaping.

Figure 4-6: Multi-family with vegetated bioretention area. (Photo courtesy of Michael Barrett)

Parking lots in multi-family developments, Figure 4-7, can be outfitted with permeable pavement parking stalls. These permeable pavers serve to reduce the quantity of stormwater as well as improve the functional and aesthetic experience of the parking lot.

Figure 4-7: Multi-family units utilize permeable pavers to beautify their parking lot

Multi-family developments on waterfront lots should include the same elements as other multi-family developments, including disconnection and minimization of impervious cover, pervious pavement, and bioretention or infiltration areas.

4.8.5. COMMERCIAL/RETAIL/OFFICE

Commercial developments are frequently built with a high percentage of impervious cover. When detention is not required, feasible stormwater solutions include permeable pavement, bioretention, infiltration, and, depending on the land use and character of the surrounding land, vegetated filter strips. Figure 4-8 demonstrates how a variety of sustainable stormwater practices can be integrated into the site design. Parking lots can be outfitted with bioretention areas in the center medians, as shown in Figure 4-8, or vegetated filter strips on the edges. Trees in these center islands can provide welcome shade during hot Texas summers.

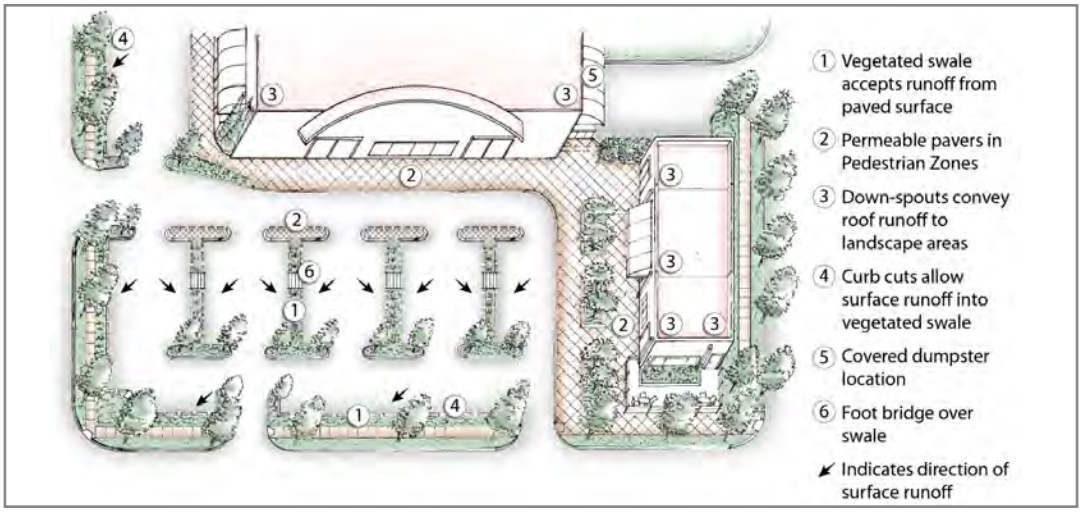

Figure 4-8: Commercial development incorporating sustainable drainage practices.

Parking lots are a key part of commercial establishments and serve as the customer's initial introduction to the business. Parking lots can reflect the quality of the business, and a puddle-free lot with landscaped or shaded areas can improve the customer experience. Figure 4-9 shows two different parking lot designs, one with stormwater controls included in the design, and the other designed and built in a conventional manner.

Figure 4-9: Parking lots can positively influence the customer experience at a commercial development.

To reduce standing water after a storm, parking lots can be fitted exclusively or in part with permeable pavement. While porous pavement is one option is for the entire parking lot, another common configuration includes standard pavement driving lanes which slope towards permeable parking stalls. This is illustrated below in Figure 4-10.

Figure 4-10: Permeable interlocking concrete pavers with regular asphalt driving lane in Cascade Park parking lot, Cameron County, Texas.

Example project designs can be found in the Appendices in the upcoming Manual edition, this will follow EPA and NOAA approval.